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Closing a Liquid Manure Storage Structure

Steve Higgins and Kylie Schmidt, Biosystems and Agricultural Engineering

Liquid manure storage structures, such as a lagoon, holding pond, or pit, serve an essential purpose on an active livestock operation. However, when this structure is no longer actively managed it can become a major liability to the producer because of its potential to have a discharge. The discharge from a liquid manure storage structure can contain pollutants such as nutrients, heavy metals, hormones, pathogens, and agriculture chemicals, all of which can pose serious threats to human health and aquatic ecosystems. Because of the pollution potential, livestock producers ceasing their operation are required to close their liquid manure storage structure(s) as part of their Kentucky No Discharge Operational Permit. To help offset the costs of closing the structure, producers may want to apply for cost share funds through the Division of Conservation. Before beginning to close a liquid manure structure, the Kentucky Division of Water (KDOW) must be provided with a closure plan. This publication outlines the preferred practices and steps for closing a liquid manure structure to meet the guidelines of the KDOW.

Closure Plan

The closure plan must include the following information:

1. The closure option
2. How the conveyances (e.g. pipes, chutes, ramps, etc.) into the liquid manure structure will be plugged, removed, blocked, etc. to make them unusable
3. How the contents of the liquid manure in the structure will be removed and properly disposed

Producers should send the closure plan to the Kentucky Division of Water, Surface Water Permits Branch (address is located at the end of the publication).

Closure Options

The two options for properly closing a liquid manure structure are:

- Permanent closure
- Conversion to a farm pond or irrigation storage structure

Permanent Closure

Permanent closure returns the storage structure site to the original topography. If the liquid manure structure is to be permanently closed, erosion and runoff control measures should be implemented during construction. These measures may include using silt fences, hay bale barriers, temporary vegetation, and mulching. The area should be backfilled and graded to return the slope to appropriate contours. Backfilled soil should be slightly mounded over the site so that runoff still occurs after the backfill settles or subsides. Vegetation should be established on the site to prevent erosion. For more information on how to implement erosion prevention best management practices, visit http://www.kutrc.ku.edu/pdffiles/esc_guide.pdf.

Conversion to Fresh Water Holding

Converting a liquid manure structure to a fresh water resource (e.g. fish pond, swimming pond, or livestock watering) is not encouraged because of concerns for public and animal health. If wastewater and sludge are not completely removed, the water might not meet water quality guidelines for livestock drinking, aquatic life, or recreation. Another concern is that many liquid manure structures have met their engineered life. Conversion to a freshwater pond should not be made without making sure that the berms still meet engineering standards. Install fencing and warning signs to ensure that the structure is not used for purposes incompatible with current water quality standards.

Closure Concepts

The concepts for closing out a liquid storage structure are the same regardless of the option:

1. All closure activities must be conducted so that surface and ground water are not impacted by runoff during the closure of the structure or land application of wastes.
2. All pipes, such as those coming from a milk house, milk parlor or barn, ditches, and conveyances, leading to the structure need to be removed and replaced with compacted earth. The concept is to remove all conveyances of liquids to the closed structure. Although it may not be practical to remove concrete ramps leading to the storage structure, runoff can be diverted by installing shot rock or channel lining at the end of the ramp.
3. Liquid and slurry wastes should be removed from the liquid manure structure using conventional pumping methods. Typically, this is accomplished by agitating the lagoon and pumping out as much material as possible. If clean water is available, it should be added as necessary to facilitate the agitation and pumping. Once the structure has been dewatered, use excavation equipment to remove the sludge. Some of the sludge combined with a thin layer of soil can be used to establish vegetation on the finished site. During the waste removal step, it may be cost effective to separate liquid and solids, especially if shipping the material off-site is necessary.
4. The Kentucky Agriculture Water Quality Act requires that land applications of liquids and solids be made using a developed Nutrient Management Plan (NMP). A plan requires analyzing the sludge and wastewater for nutrient content. Producers should use a phosphorus-based application rate based on the subsequent crop. See

University of Kentucky Cooperative Extension publication ID-211: Kentucky Nutrient Management Planning Guidelines (KyNMP) for developing a KyNMP and calculating application rates. If state or federal cost share is used, then a Comprehensive Nutrient Management Plan may be required.

5. Minimize nuisance complaints resulting from odors associated with emptying and land applying wastewater and sludge from a liquid manure structure by using an incorporation application method and adhering to required setbacks, which also can be found in ID-211. Land application should be conducted when the humidity is low, winds are calm, and wind direction is away from populated areas. Producers may want to inform neighbors before land application to avoid complaints. Again, all closure activities must not impact surface or ground waters.

Summary

Livestock producers who cease operations are required by law to close their liquid manure structure. Liquid manure structures that are not managed are a major environmental and financial liability to livestock producers. The best option for closing a liquid waste structure is to permanently close it and restore the original topography. Producers may be able to obtain financial and technical assistance from the Conservation District to accomplish this, but it is ultimately the producer's responsibility to properly close the storage structure. The proper closure of a liquid manure structure is necessary to ensure public health and remove liability. The law governing the closure of structures requires the following:

- The process does not impact the waters of the Commonwealth in any way.
- Liquids are no longer conveyed to the structure.
- Erosion and runoff is controlled and managed.
- The land application of wastewater and sludge is in accordance with a NMP.
- Management practices are in place to avoid nuisance complaints.

Closure plans should be sent to:

Division of Water
Surface Water Permits Branch
200 Fair Oaks Lane
Frankfort, Kentucky 40601

References

Natural Resources Conservation Service.
Conservation Practice Standard Code 360: Closure of Waste Impoundments. Accessed at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046941.pdf
Permits to construct, modify, or operate a facility, 401 KAR 5:005. (2010).

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